Green Municipal Aggregation in Massachusetts

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GREEN ENERGY CONSUMERS ALLIANCE

Formerly Mass Energy/ People's Power & Light

www.greenenergyconsumers.org

Cover image: Original artwork from Massachusetts College of Art and Design student, Melanie Viens, created for Green Energy Consumers.

About Green Energy Consumers and Our Interest in Green Municipal Aggregation

Green Energy Consumers Alliance (formerly Mass Energy/People's Power & Light) was founded in 1982 as a nonprofit consumer and environmental advocacy organization dedicated to making energy affordable and environmentally sustainable. Our mission is to harness the collective power of energy consumers to speed the transition to a low-carbon economy.

Green Energy Consumers operates several consumer-focused programs. In 1998, our organization became one of the first to market a retail green power product, offering consumers the opportunity to meet their electricity needs with renewable energy. In 2002, we launched a product called *New England Wind*. The Hull 1 wind turbine was the first project in our portfolio and produced one of the first Renewable Energy Certificate (REC) purchases in New England. Green Energy Consumers' products for individual consumers, *New England Green Start* and *New England Wind*, are examples of voluntary green power. They were designed to bring new renewable generation onto the grid, accomplished by purchasing and retiring Class I RECs on behalf of our members. These programs share the same foundation upon which we have built the Green Municipal Aggregation (GMA) model with Good Energy, LLC.

Green Energy Consumers supplies renewable energy over and above the amount required to meet the Renewable Portfolio Standard (RPS) mandate for green municipal aggregations in Arlington, Brookline, Dedham, Somerville, Sudbury, and Winchester. Green Energy Consumers also supplies additional Class I RECs for the 100% renewable energy option offered as an even cleaner alternative to the GMA default of RPS+5% or more.

This paper is intended to serve as a resource to individuals wishing to understand GMA and communities considering GMA as part of a comprehensive community-scale clean energy and climate plan. Additional resources for technical assistance and next steps are included at the end.

For more information, visit **www.greenenergyconsumers.org**.

Hull 1 Wind Turbine

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Glossary

Additionality: The increased demand for renewables with verifiable Greenhouse Gas (GHG) emission reductions over and above what is required by law. In Massachusetts the pertinent law is called the Renewable Portfolio Standard (RPS). Additionality is the fundamental difference between aggregations that claim to be green and those that displace fossil fuels on the regional electricity grid.

Basic Service: The default electricity supply product provided by the electric company and delivered to customers who do not purchase an alternative from a competitive supplier or through a municipal aggregation.

"Brown" Aggregation/Standard Aggregation: "Brown" power refers to electricty generated from non-renewable sources, as opposed to "green" power, which is renewable. A "brown" or "standard" aggregation is the bulk purchase of electricity supply by a city or town whose content is the same as Basic Service. A standard aggregation includes only the amount of renewable electricity required by the RPS.

Competitive Supplier: An entity that sells electricity supply to consumers as an alternative to a utility's Basic Service offerings. Competitive suppliers are licensed to operate by the Massachusetts Department of Public Utilities, but they are not regulated in the same way as electric distribution companies like Eversource, National Grid, or Unitil.

Class I Resource: New RPS-eligible projects like wind, solar, and anaerobic digester gas that began commercial operation after December 31, 1997 and that are directly fed into the New England grid.

Class II Resource: Existing, or old, RPS-eligible projects that were in commercial operation *before* January 1, 1998.

Green Communities Act (GCA): Enacted in 2008, GCA enhanced the Massachusetts' RPS by creating a distinction between Class I (new) and Class II (existing, old) resources. GCA also established a requirement that the percentage of Class I supply should increase 1% per year, indefinitely. The law created the Energy Efficiency Advisory Council (EEAC) comprised of stakeholders from multiple sectors who inform the development and implementation of DPU-approved energy efficiency programs that regulated gas and electric utilities are mandated to provide. Finally, GCA established the Green Communities Division housed at the Executive Office of Energy & Environmental Affairs (EOEEA) and responsible for helping cities and towns in the Commonwealth increase energy efficiency and renewable energy toward achieving net zero energy.

Greenhouse Gas(es) (GHG): A gas, such as carbon dioxide or methane, that contributes to climate change when emitted into the atmosphere. GHGs are emitted in high concentration through the burning of fossil fuels and must be curbed in order to combat climate change.

Green Municipal Aggregation (GMA): A model of aggregation in which the default option – the alternative to Basic Service into which all participants are automatically entered – includes a commitment to at least five percent (5%) more Massachusetts Class I resources than the minimum percentage required by the state's RPS. GMA enables communities to affordably increase the renewable energy content of their electricity supply relative to Basic Service in a manner that drives demand for new, in-region renewable resource.

Global Warming Solutions Act (GWSA): Enacted in 2008, GWSA requires that Massachusetts reduce its statewide greenhouse gas emissions 25% below 1990 levels by 2020 and 80% below 1990 levels by 2050.

Investor-Owned Utility (IOU): A private business organization that provides a utility (public product or service). In this context we are speaking of IOUs presiding over electricity, such as Eversource, National Grid, and Unitil.

Independent System Operator of New England (ISO-NE): ISO-NE is a non-profit regional transmission organization (RTO) charged with maintaining reliable electricity to all six New England states. ISO replaced NEPOOL in 1997 following restructuring and is responsible for operating the region's bulk electric power system, implementing wholesale markets, and ensuring open access to transmission lines. It is overseen by the Federal Energy Regulatory Commission (FERC).

Megawatt (MW): A unit of power equal to one million watts and often the output measurement from a power station. We have found that one megawatt of wind power is enough to power an average Massachusetts home for two months.

Megawatt hour (Mwh): An amount of energy over time and equal to 1,000 kilowatt hours (kWh) or one thousand kilowatts (kW) of electricity used continuously for one hour. Megawatt hours is the standard unit for how wholesale power is bought and sold between utility companies and power generators.

New England Power Pool (NEPOOL): A voluntary association of market participants from the six New England states established in 1971 to foster coordination across utilities in the region. ISO-NE replaced NEPOOL in 1997 and now oversees regional grid operation, but NEPOOL's governing body, the Participants Committee, considers and acts on all matters affecting the region's wholesale electric power arrangements. NEPOOL also manages NEPOOL GIS database used for tracking RECs.

New England Power Pool Generation Information System (NEPOOL GIS): Issues and tracks renewable energy certificates for all MWh of generation and load production in ISO-NE's control area and MWh imported from adjacent control areas. NEPOOL GIS also tracks emissions attributes for generators in the region.

Renewable Energy Certificate(s) (REC): Certificates that represent the environmental attribute of electricity produced from a renewable source. RECs are used as tracking mechanisms for renewable energy. One REC is equivalent to one megawatt hour of renewable energy generated. RECs are tradable commodities, but each REC can only be claimed once and it is retired after use. In Massachusetts, RECs are classified into categories based on specific criteria outlined in the state's RPS.

Renewable Portfolio Standard (RPS): Massachusetts law that require a certain percentage of the state's electricity to come from renewable energy. Different kinds of RECs are separated into classes based on criteria in this law. "Class I" RECs come from certain types of New England renewable energy generators built since 1997 (mostly wind and solar, but also some forms of hydro and biomass). Per the RPS, all electricity suppliers (such as Eversource, National Grid and competitive power suppliers, but excluding municipal utilities) must source a certain percentage of their electric load from Class I projects. The percentage required goes up 1% every year.

Executive Summary

Municipal aggregation, first enabled in 1997, is the bulk purchase of electricity supply by a city or town on behalf of the residential and small business customers in that community. Aggregation offers an alternative to Basic Service – the default electricity supply provided by utilities – or products offered by competitive suppliers. Aggregation is frequently undertaken to stabilize or reduce the cost of electricity for those customers.

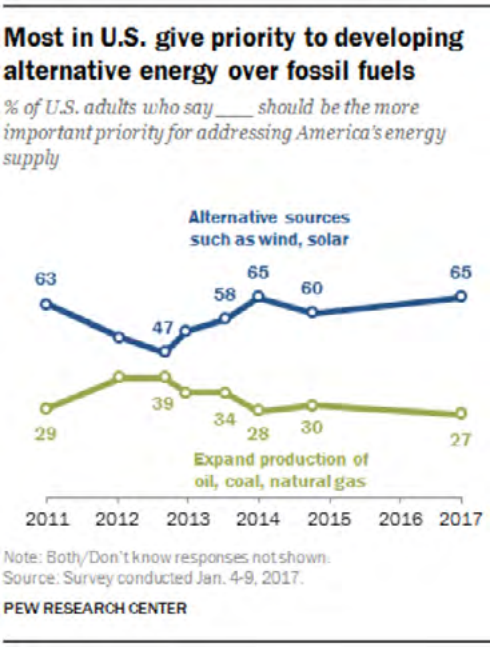
In 2015, Green Energy Consumers collaborated with Good Energy, LLC. to develop a new approach to municipal aggregation called Green Municipal Aggregation (GMA). GMA is a model of aggregation in which the default option – the alternative to Basic Service into which all participants are automatically enrolled – includes a commitment to more Massachusetts Class I renewables than the minimum percentage required by the state's Renewable Portfolio Standard (RPS). Similar to RPS compliance, a community's purchase of additional renewable energy is demonstrated by way of purchasing Renewable Energy Certificates (RECs) from eligible projects. GMA empowers cities and towns to choose electricity supply that is significantly greener than their utility's default offering, while also delivering price stability and potential cost-savings to residents and small businesses.

GMA has been successfully implemented in Arlington and Brookline as *Community Choice Aggregation*, in Dedham as *Community Electricity Aggregation*, in Somerville as *Community Choice Electricity Aggregation*, in Sudbury as *Town-Wide Electricity Aggregation*, and in Winchester as *Community Choice Electricity*.

GMA is a climate mitigation tool

People want to address climate change and they want more clean energy as part of it. According to a June 2017 poll by WBUR,[1] nearly 90% of Massachusetts voters believe in and are concerned about climate change. 74% of respondents were willing to pay $10 more per month on their energy bill if doing so would significantly reduce GHG emissions. While the Commonwealth works to comply with Global Warming Solutions Act (GWSA), reducing emissions across all sectors 25% by 2020 below 1990 levels and 80% by 2050, communities are setting and pursuing their own goals for carbon reduction.

Decarbonizing electricity supply is an essential and cost-effective way to achieve the deep emission reductions required to meet the GWSA mandates. The RPS drives state-level renewable energy development, but only to the extent that the annual minimums must be met. The voluntary purchase of renewable electricity in excess of the RPS requirement, like that enabled by GMA, is another factor that can accelerate the development of renewable energy generation.



A national survey conducted by the Pew Research Center in January 2017 revealed support for wind and solar, like that required to comply with the RPS or to meet voluntary demand set by GMA, is stronger than ever.

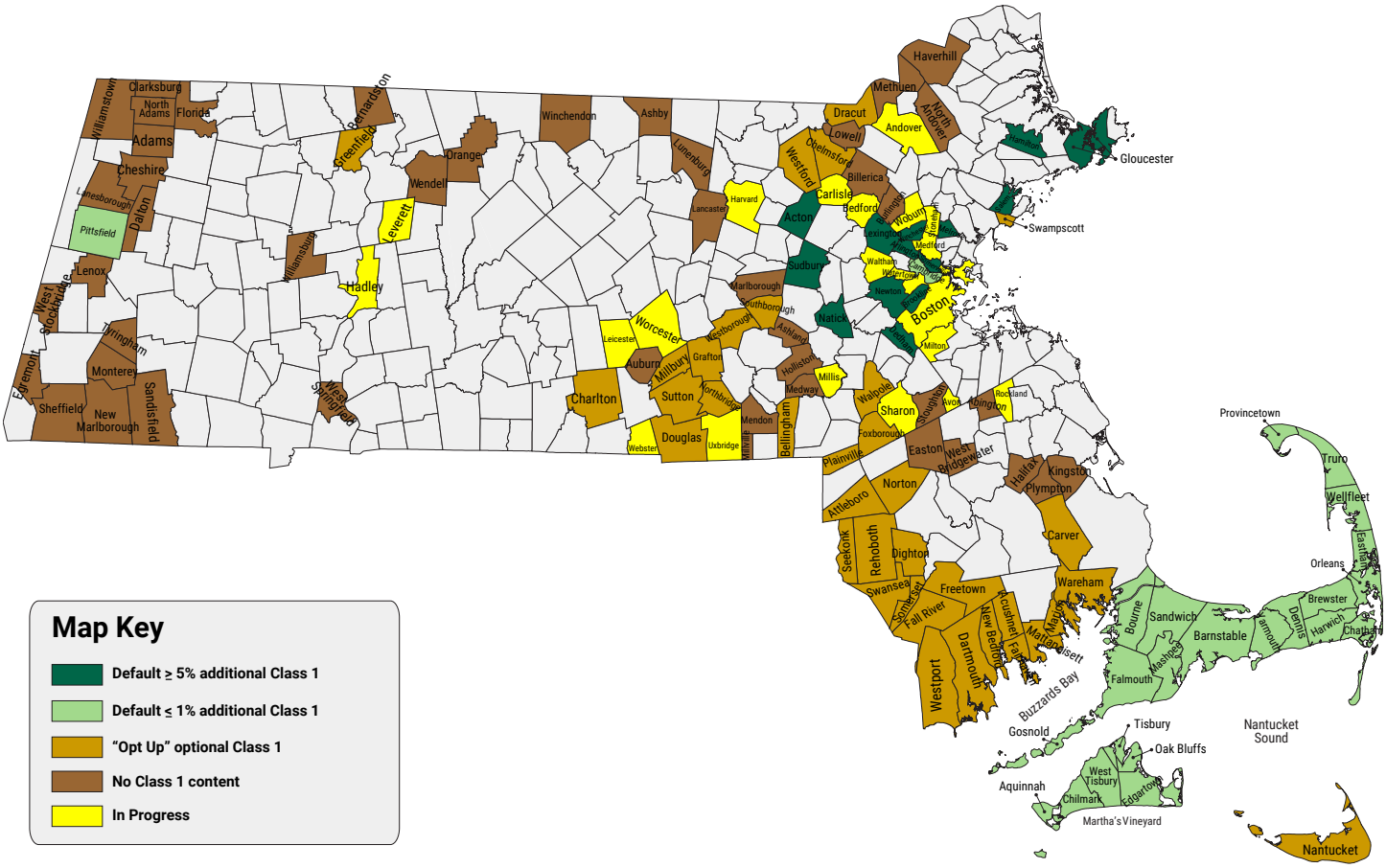
Source: www.pewresearch.org/fact-tank/2017/01/23/two-thirds-of-americans-give-priority-to-developing-alternative-energy-over-fossil-fuels/

1 www.wbur.org/news/2017/06/28/wbur-poll-climate-change-concern-increases

As more communities turn to aggregation to help meet GHG emission reduction targets set as part of a community-adopted clean energy and climate plan, GMA becomes a climate mitigation strategy implemented locally, but that has a state and regional impact.

Not all aggregations are created equally.

There is a fundamental difference between aggregations that claim to be green and those that certifiably help to displace fossil fuels in New England. The firm commitment to additional RPS-eligible renewables (e.g., new, in-region wind, solar, etc.) at the heart of GMA is what sets this model apart from other approaches to aggregation. GMA creates ***additionality***, the increased demand for renewables with verifiable greenhouse gas (GHG) emission reductions over and above what is required by law. This distinction is especially important for those communities employing aggregation to reduce their carbon footprints or to help meet GHG emission reduction targets set as part of a community-adopted clean energy and climate plan.



There are approximately 145 cities and towns in the Commonwealth with an aggregation plan in place or in the process of being developed. Many of these aggregations have a supply that is the same as Basic Service: "brown power" plus the RPS requirement. Some of these communities have negotiated an aggregation whose default offers less than or equal to 1% more renewable content than the RPS or whose standard aggregation includes an optional offer to "opt up" to more Class I. A handful of the 145 communities, those show in dark green, have aggregations whose default supply includes 5% or more Class I, thus exceeding the minimum required to comply with the state's RPS. These communities have implemented GMA. Their aggregations are driving demand for new, in-region renewables. The

increased demand is helping to hasten the transformation from fossil fuel generation to renewable power that is needed to achieve the GHG reductions required by the GWSA and that are necessary to combat climate change.

GMA is working

Communities where GMA has been implemented are demonstrating that additional renewable energy can be delivered to Massachusetts residents and businesses **affordably** and, at times, for less than the utility's Basic Service rate. As illustrated in the table, several eastern Massachusetts communities in Eversource territory leveraged their purchasing power to negotiate an alternative to Basic Service that is **less expensive yet delivers more renewable content** than Eversource's Basic Service offering.

Green Municipal Aggregation Rates

Town	Contract Length	Default Green (5%)	Opt-Up (100%)
Dedham	1/2018 - 1/2021	$0.10272	$0.12622
Somerville	7/2017 - 1/2020	$0.10538	$0.13198
Sudbury	8/2017 - 2/2020	$0.10749	$0.13124
Arlington	8/2017 - 2/2020	$0.10756	$0.13131
Winchester	7/2017 - 1/2020	$0.10898	$0.13558
Brookline	7/2017 - 1/2020	$0.11098 (Default Green 25%)	$0.13198
Eversource Basic Service rate $0.12888 2/1/2018-6/30/2018			

According to Applied Economics Clinic,[2] residential customers in Arlington, Dedham, Somerville, Sudbury, and Winchester will save an average of 19% compared to customers on Eversource's Basic Service rate. Small business customers in the same communities will save an average of 18% over the Eversource Basic Service rate during the first six months of 2018. Brookline's aggregation, where the default offer is 25% more renewable supply than Basic Service, is still $0.02 cheaper than Eversource. Customers in these communities who "opt up" to 100% green power met with Massachusetts Class I RECs will pay roughly the same through the aggregation as they would have for Eversource's less renewable Basic Service offering.

2 static1.squarespace.com/static/5936d98f6a4963bcd1ed94d3/t/5a1ed4e58165f542d6481501/1511970021847/Updated+CCE+rates_onepager.pdf

Applying lessons learned so far.

In addition to being an effective climate mitigation strategy, the economics of GMA are sound. It delivers a socially-equitable climate solution, it is scalable and implementable in the near term, but the impacts are enduring. The model is also malleable such that it can complement and enhance other mitigation measures and strategies.

Green Energy Consumers and Good Energy, LLC. first developed the GMA model in 2015, making it a relatively new concept. However, in that short time, several key lessons have been learned, and preliminary best practices have been identified. These are discussed in this paper and should be considered by individuals interested in understanding GMA and communities beginning to explore its possibilities.

1. Communities considering aggregation should form an advisory committee made up of public officials and interested, knowledgeable citizens to study the concept and to take the lead on educating the public and selecting a qualified energy consultant.

2. A consultant should be selected upon their successful experience with aggregation in other jurisdictions and their commitment and demonstrated expertise on additionality. In addition, you may wish you consider whether the consultant is able to integrate other energy services (such as storage) with the supply portion of the aggregation.

3. Once the aggregation has been approved by the Department of Public Utilities and has commenced operation, the previously mentioned advisory committee should continue to meet, perhaps quarterly, to ensure accountability, monitor progress, and learn together about how to optimize the aggregation.

4. If the aggregation is going to offer consumers an opportunity to opt-up to 100% Class 1 resources, it should have a marketing plan. Some communities have implemented successful campaigns and could be looked to for guidance.

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Introduction

The Massachusetts Global Warming Solutions Act (GWSA) (2008), mandates economy-wide greenhouse gas (GHG) emission reductions of 25% below 1990 level and 80% below 2050. Meeting this mandate will require action taken in all sectors, but *greening up*, or decarbonizing electricity supply is one of the most cost-effective strategies for achieving deep GHG reductions in the immediate term, while setting the Commonwealth on a path to enduring success.

There are state and regional policies and programs in place that help to bring new renewable energy online and/or displace the dirtiest GHG-emitting generation in our energy portfolio. The state's Renewable Portfolio Standard (RPS) is one such mechanism. The RPS requires regulated distribution companies (e.g., National Grid, Eversource, and Unitil) and competitive suppliers to provide customers with a minimum percentage of renewable energy content. This policy has been instrumental in driving development of renewable generation since it was first implemented in 2003. However, the RPS only drives the development of new renewables to the extent that the annual minimums must be met. But mandates like the RPS can be complemented by the voluntary purchase of renewable electricity.

Brookline receiving award for their GMA program at Green Energy Consumers' 35th Anniversary

In Massachusetts, communities can participate in *municipal aggregation*. In a standard aggregation, a city or town purchases electricity in bulk on behalf of residents and small businesses in the city or town. This is frequently done to deliver cost-savings relative to the utility's Basic Service option. But municipal aggregation can also be leveraged to dictate the *content* of a community's electricity supply. With this in mind, Green Energy Consumers and Good Energy, LLC. developed a model of aggregation intended to help cities and towns to choose electricity supply that is significantly greener than Basic service while also delivering cost-savings and price stability to residents and small businesses. We call this model Green Municipal Aggregation (GMA).

The fundamental characteristic of GMA is a default electricity supply option that includes at least 5% more Class I renewable content than is required by the state's RPS. GMA has other benefits, too. The process fosters civic engagement and is as much a tool for outreach and education about clean energy and electricity supply as it is a tool for combating climate change. This is especially crucial at a time when public consensus is needed on how to mitigate climate change and create a new energy paradigm.

GMA can instigate development of new, in-region renewables (primarily wind and solar) that contribute to a faster transition to clean energy. This is because GMA creates ***additionality***. Additionality is defined as the increased demand for renewables with verifiable GHG emission reductions over and above the state's required minimum amount. The difference between an aggregation that claims to be green and one that certifiably helps to displace fossil fuels in New England hinges on whether or not the aggregation creates additionality. This distinction is especially important for those communities looking to aggregation to help meet GHG emission reduction targets set as part of a community-adopted clean energy and climate plan.

Most recently, GMA has been adopted by Arlington, Brookline, Dedham, Somerville, Sudbury, and Winchester. It is also being considered elsewhere. These communities now have a power supply that includes approximately 40% more wind and solar than required by the RPS. Brookline's aggregation offers approximately **three times** more wind and solar than mandated by state law. Altogether, these six communities are creating renewable energy demand equivalent to the output of 15-20 large-scale wind turbines. They are demonstrating that municipal aggregation can be leveraged to reduce a community's carbon footprint and to drive development for new renewables. They have shown that at least five percent (5%) more Class I resources than required by state law can be delivered affordably. As more cities and towns turn to aggregation to decarbonize their electricity supply, the collective impact will be even more substantial and the resulting voluntary demand for new renewables will become a strong factor in the New England energy market.

Wind turbines in Gloucester, MA

Understanding Municipal Aggregation

With the passage of the 1997 Electric Restructuring Act, Massachusetts became one of the first states to enable municipal aggregation. Restructuring required investor-owned utilities to operate solely as distribution companies that maintaining power lines and provide customer service to electricity customers. Eversource, National Grid, and Unitil now purchase electricity wholesale and sell it to retail as Basic Service to customers who have not chosen a competitive supplier. A competitive supplier is an entity licensed, but not regulated by the Department of Public Utilities (DPU) to sell electricity supply to customers as an alternative to Basic Service.[1] When an individual, business, or community contracts with a new electricity supplier, the transmission, distribution, and billing components of the system are maintained by the incumbent utility.

Many large energy users – manufacturers, universities, hospitals – choose to contract with a competitive supplier, but residential and small business customers are generally not well-served by the largely unregulated competitive electricity supply market.[2] As a result, customers in these sectors tend to rely on Basic Service. Municipal aggregation offers an alternative to competitive suppliers and to Basic Service. Aggregation restores transparency to the energy purchasing process by offering community members a well-vetted product and the ability to opt-out at any time without penalty.

A community may elect to pursue aggregation for a variety of reasons, most notably to reduce electricity prices and to achieve cost stability. Municipal aggregation also empowers communities to have more influence over where their energy supply comes. Thus aggregation can be utilized to help a community increase the renewable energy content of its electricity supply or to reduce GHG emissions. This is the premise upon which GMA is based.

Aggregation offers a potential cost-saving supply alternative for residential and small business customers.

Basic Service is the default electricity supply service provided to customers of a regulated distribution company who have not signed up with a competitive supplier. Most small electricity customers assume that Basic Service is the best deal available, but the Basic Service rate is volatile. This volatility is primarily tied to the cost of natural gas. Figures 1 and 2 illustrate fluctuations in Basic Service for both Eversource (June 2006 to June 2018) and National Grid (October 2004 to October 2018).[3] Price is shown on the left side of the Y-axis with time shown on the X-axis.

1 The DPU grants licenses to competitive suppliers based on a review of their technical and financial ability to offer such products. For additional information see **www.energyswitchma.gov/#/faq/glossaryterms**.

2 It is difficult for competitive suppliers to recoup customer acquisition costs while offering a product that legitimately provides value to the customer. Competitive suppliers may offer initial low rates, but consumers may be caught off guard to find those low rates adjusted upwards soon thereafter. As a consumer advocacy organization, Green Energy Consumers cautions against contracting with competitive suppliers for this reason. This is also why we argued in favor of aggregation twenty years ago.

3 **www.mass.gov/service-details/basic-service-information-and-rates**

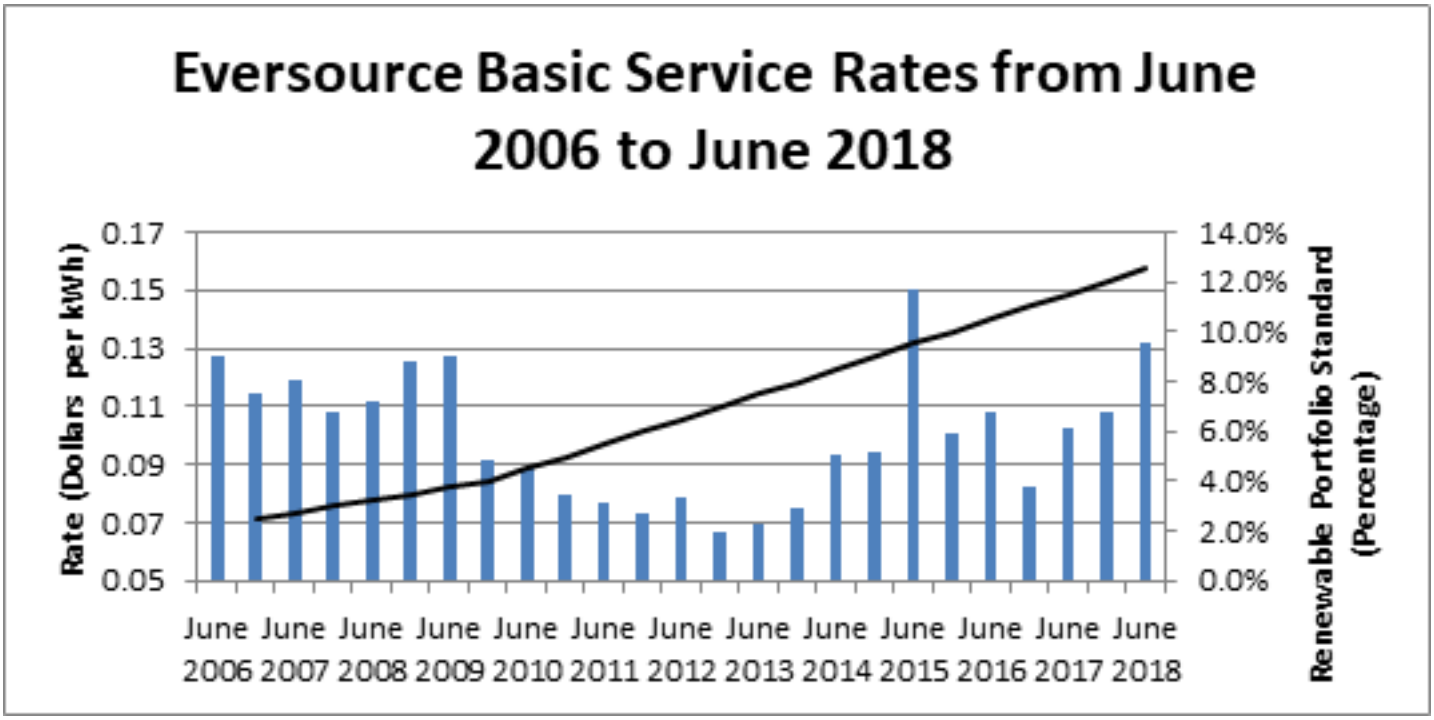


Figure 1.

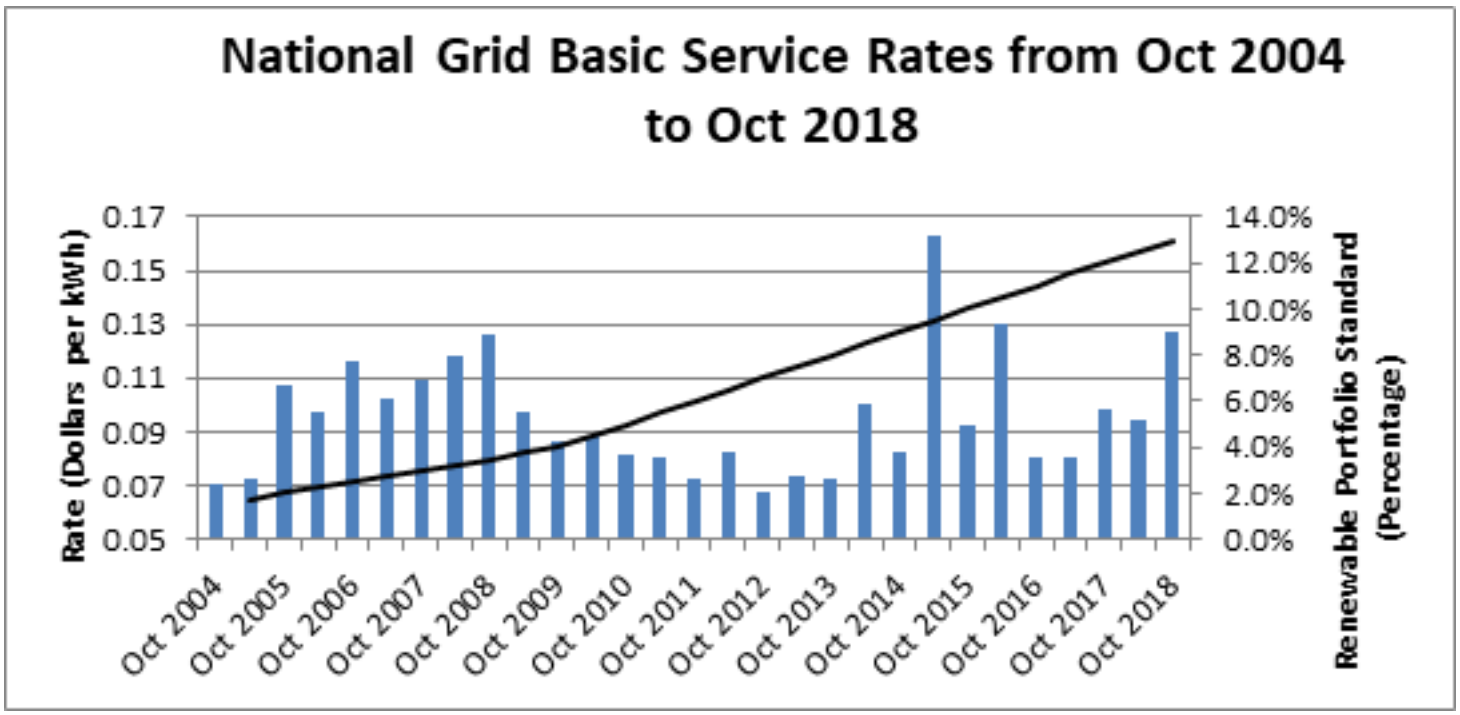


Figure 2.

Citing this volatility, competitive suppliers often entice consumers with initially low variable rates that are less than the current Basic Service rate. Consumers who overlook the fine print can be caught off guard when the competitive supply rate is adjusted upward soon thereafter. By and large, individual residential customers and small businesses have been unable to find competitive electricity suppliers offering a better option than utility Basic Service over an extended period of time. However, municipalities with aggregation programs are better able to ensure cost stability and price reductions because they negotiate their contracts with competitive power suppliers and can choose the timing and length of their electricity purchases.

Aggregation can accelerate the shift from fossil fuels to clean energy.

Basic Service and competitive suppliers are subject to compliance with the state's RPS. In 2018, the RPS Class I requirement is 13% of electricity supply. That amount increases 1% each year. The RPS is an essential driver of clean energy development in the region, but the mandate alone is not sufficient to fully decarbonize electricity supply at the rate necessary to meet the mandates of GWSA. Some communities, such as Boston, have pledged to be carbon neutral and/or 100% renewable by 2050.

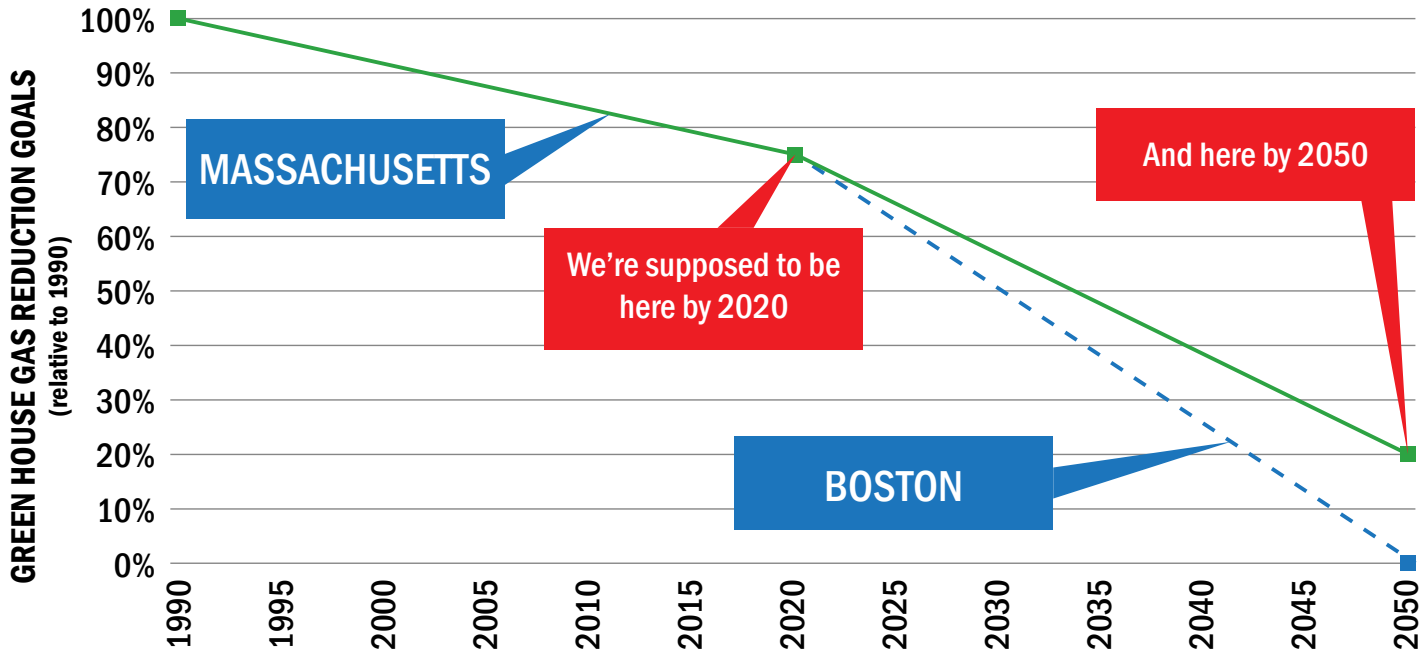


Figure 3. Sources: www.boston.gov/departments/environment/climate-action-plan and www.mass.gov/eea/air-water-climate-change/climate-change/massachusetts-global-warming-solutions-act/

Opponents of clean energy often point to the cost of renewables as reasons for not moving faster to replace fossil fuel power generation with renewables. However, it should be noted that while the RPS mandate to purchase wind, solar, and other renewables adds some cost, other factors, including consumption, transmission costs, and distribution costs, exert a larger influence on the retail price of Basic Service. Look again at Figures 1 and 2. In addition to illustrating rate fluctuations, the Y-axis on the right side depicts how the percentage of renewable energy content has slowly and steadily increased over time. There appears to be no correlation between the RPS line and the rates.

Massachusetts is part of the New England Power Pool (NEPOOL). A consumer in any one of the six states in the region can be served by a supplier procuring electricity from any power plant serving the region. That can include power plants from Canada and New York that export power into our region. Therefore, utilities offering Basic Service are able to choose power originating from any state and coming from any source. In New England, the "marginal resource," meaning the last one needed to meet additional demand, is natural gas. For this reason, putting more renewable energy onto the grid anywhere in New England displaces fossil fuel generation, consumption, and GHG emissions.

Because GMA includes a commitment to RPS Class I resources in excess of state minimum requirements, communities that undertake green municipal aggregation help to stimulate and accelerate growth in the renewable electricity market.

For more information about solar energy, specifically, see Appendix 4.

Building a voluntary market on a strong foundation.

The RPS sets the minimum percentage of renewable energy content that must be included in our electricity supply each year, but it also defines what types of technology or projects are eligible to meet the requirements. Class I resources are new projects, including wind, solar, and anaerobic digester gas that began commercial operation after December 31, 1997. These projects do not need to be located in the Commonwealth, but they must be located in the region and must feed into the New England power grid. Under the current RPS, the amount of Class I required increases 1% each year. As a mandate for quantity of renewable content with requirements for what can be used to meet it, the RPS drives demand, and supply has to catch up. Similarly, the voluntary purchase of renewable electricity like that instigated by GMA also creates demand for *new* renewable energy content.

There is consensus among the Commonwealth's leading environmental organizations that voluntary renewable energy programs, whether at the individual or community level, should be based upon Class I resources.

Annual RPS compliance is demonstrated via the purchase of Renewable Energy Certificates (RECs) from eligible projects. RECs represent the environmental attribute of electricity produced from a renewable source. Their value is dictated by market conditions needed to bring increasing amounts of green power onto the grid. One REC is equivalent to one megawatt hour of renewable energy generated. Whether used for RPS compliance or the voluntary market, a REC can only be claimed once, which is why the purchaser of the REC has the right to claim the GHG reduction associated with it.

The state's Clean Energy & Climate Plan credits each Class I REC retired from either the RPS or voluntary market towards achieving GWSA-mandated GHG reductions. By sharp and crucially important contrast, the state's GHG inventory is not adjusted for the purchase of non-Class I RECs by any Massachusetts consumers. Non Class I resources include out of region wind and solar RECs, as well as RECs from old hydropower or other renewables in the region in operation before 1997. Non Class I resources are also not counted toward GWSA goals because that power generation does not displace the use of fossil fuels in New England.

Green Municipal Aggregation in Massachusetts

Municipal aggregation has been possible since 1997, but Green Municipal Aggregation is a relatively new concept that is already yielding tremendous results in the communities where it has been adopted. It all began in late 2014 when energy broker Good Energy, LLC. entered the Massachusetts market offering consulting services to cities and towns exploring municipal aggregation. Good Energy saw that some communities were interested in using aggregation to advance their clean energy goals. They collaborated with Green Energy Consumers to develop the GMA model, which focused on incorporating additional Class I renewable energy into the supply mix.

In early 2015, the Metropolitan Area Planning Council (MAPC), acting on behalf of the City of Melrose, issued a Request for Proposal (RFP) to help the city select an aggregation consultant. Good Energy was selected and Melrose was the first community to adopt the GMA model. The town of Dedham followed closely behind. On January 1, 2016, Melrose and Dedham began their aggregations with electricity supply that cost less than Basic Service while also providing five percent more Class I RECs than required by the RPS.

In September 2015, MAPC issued another aggregation RFP with a call for proposals aimed at creating additionality and GHG emissions reduction. Again, through a competitive process, Good Energy was selected as the preferred vendor for all of the 101 communities in the MAPC service area.[4] In the summer of 2017, several more communities adopted the GMA model and hired Good Energy as their consultant: Arlington, Brookline, Somerville, Sudbury, and Winchester. Good Energy worked with the communities to develop plans, ultimately approved by the Department of Public Utilities, to aggregate their electricity supply with more renewable energy than required by state law.

4 Good Energy's selection by the screening committee does not obligate any city or town to hire Good Energy and some communities have chosen different consultants.

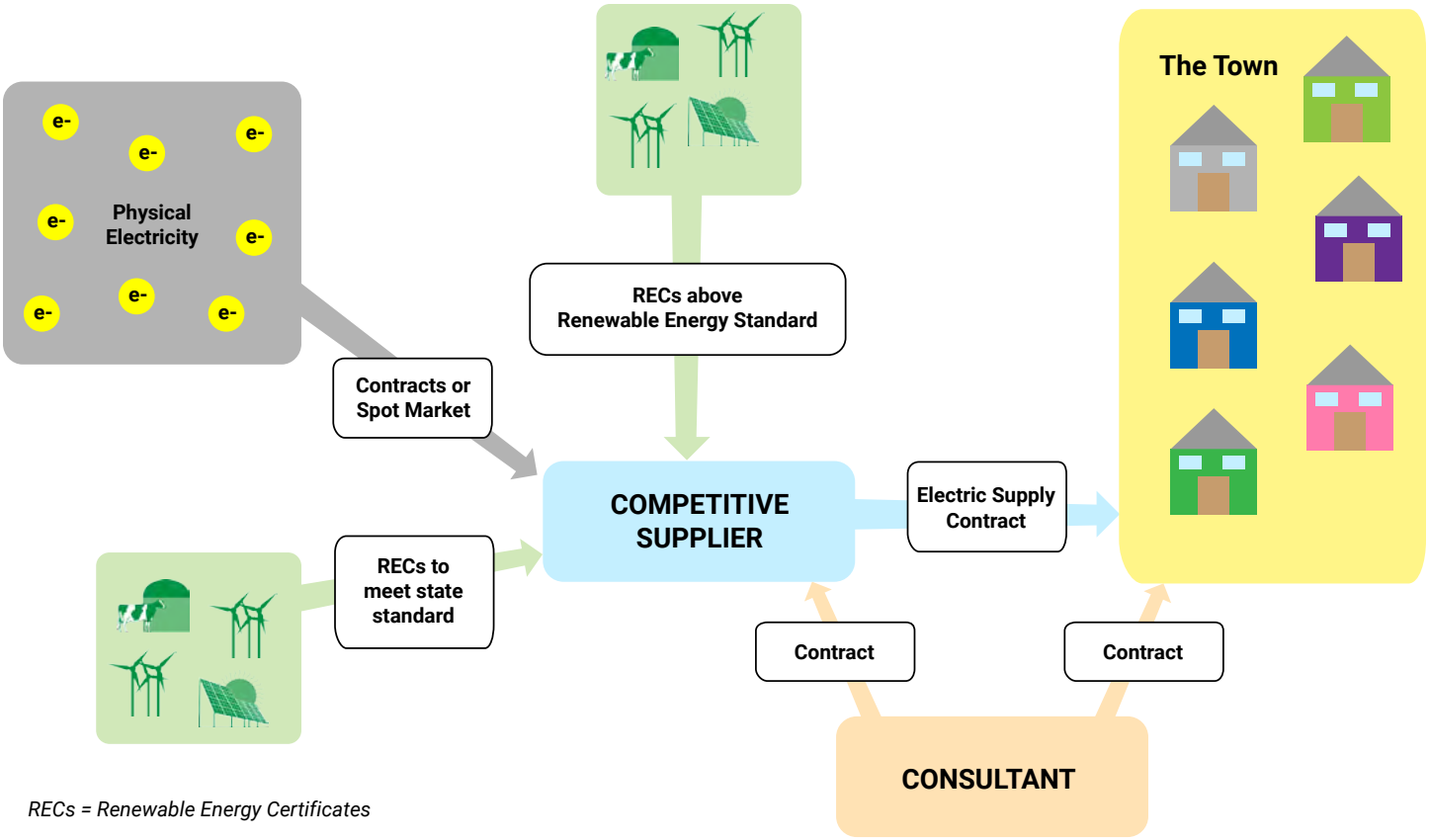


Figure 4: GMA at a glance.

In Dedham, Arlington, Somerville, Sudbury, and Winchester, the community's default product includes 5% more Class I renewables above the RPS. In Brookline, however, the default products is 25% above the RPS.

Green Energy Consumers also supplies RECs to the aggregations for their "opt-up" products offering 100% Class I RECs. Figure 4 illustrates the relationships of various parties to the community aggregation. In the case of the six municipalities we have discussed, Good Energy is the Consultant, Dynegy is the Competitive Supplier, and Green Energy Consumers supplies the RECs.

The communities mentioned above have aggregated electricity supply using the GMA model. They have prioritized clean energy, but also set a standard for the source or type of supply that can be used to meet the community's demand. They are demonstrating that additional renewable energy generated within the region can be procured in a manner that promotes GHG emission reductions while delivering savings to consumers. When clean energy is prioritized and requirements for the source or type of supply are layered into the contract, municipal aggregation becomes an excellent tool to help increase demand for renewables, reducing GHG emissions, and allocating costs and benefits equitably.

It is important to note, however, that not all aggregations are created equal, particularly when it comes to leveraging community purchasing power to accelerate adoption of Class I resources. Some community aggregation programs rely on out of region RECs or Massachusetts Class II RECs to make their green claims. REC purchases of this sort do nothing to transform the renewable content of the regional electric grid. These programs do a disservice to consumers within those communities and cause confusion among people who are trying to chart a course to a greener electricity grid.

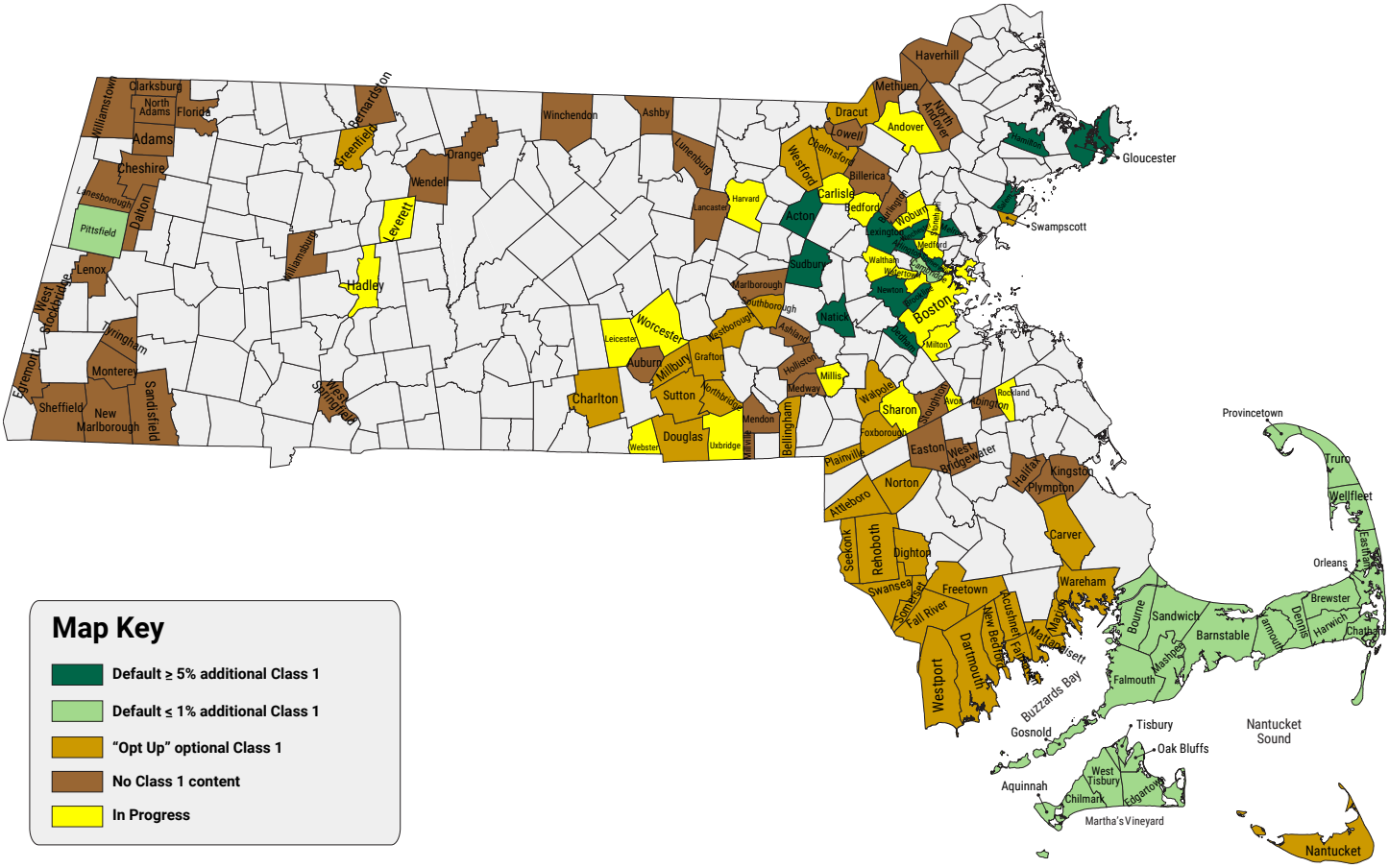


Figure 5

Figure 5 is a map of the 145 cities and towns in the Commonwealth that have an active aggregation program or are in the process of developing an aggregation plan. Not all communities are using their bulk purchasing program to add new local renewable energy through Massachusetts Class I RECs above what is mandated by the state's RPS. Many of these aggregations have a supply that is the same as Basic Service: "brown power" plus the RPS requirement. Some have negotiated an aggregation whose default offers less than or equal to 1% more renewable content than the RPS or whose standard aggregation includes an optional offer to "opt up" to more Class I. A handful of the 145 communities, those show in dark green, have aggregations whose default supply includes 5% or more Class I, thus exceeding the minimum required to comply with the state's RPS.

GMA results so far

GMA implemented in several communities in eastern Massachusetts were able to offer more renewable energy in their default product compared to Eversource's Basic Service. As Figure 6 illustrates, the 5% increase above the RPS is actually a 40% increase in wind and solar over that required by the RPS and puts the participating communities five years ahead of most others in the state. In Brookline's case, the default product is 25% above the state's mandate, putting Brookline 25 years ahead of the state. This translates into a **300% increase in the amount of wind and solar in Brookline's electricity supply**.

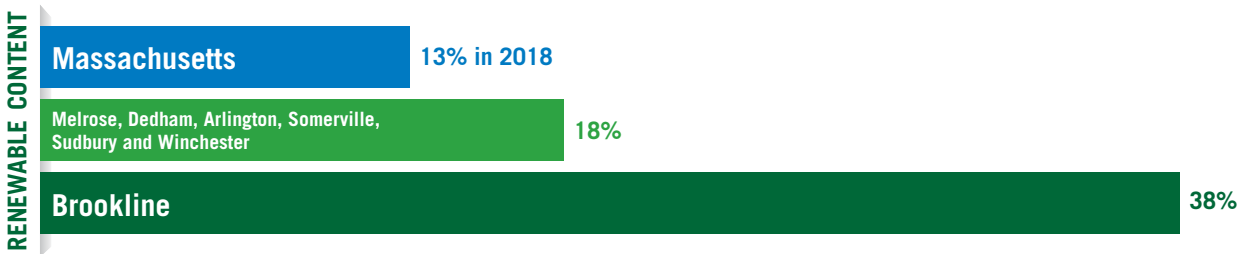


Figure 6

These communities are also offering an opt up option that includes 100% Class I, a 9-fold increase in wind and solar. Hundreds of consumers have opted up, putting them **100 years ahead of everyone else in the state**.

Green Municipal Aggregation Rates

Town	Contract Length	Default Green (5%)	Opt-Up (100%)
Dedham	1/2018 - 1/2021	$0.10272	$0.12622
Somerville	7/2017 - 1/2020	$0.10538	$0.13198
Sudbury	8/2017 - 2/2020	$0.10749	$0.13124
Arlington	8/2017 - 2/2020	$0.10756	$0.13131
Winchester	7/2017 - 1/2020	$0.10898	$0.13558
Brookline	7/2017 - 1/2020	$0.11098 (Default Green 25%)	$0.13198
Eversource Basic Service rate $0.12888 2/1/2018-6/30/2018			

Figure 7

The aggregations had lower rates than Eversource from July 1 through December of 2017, and Eversource increased its rate effective for January 1, 2018 through June 30, 2018, thereby increasing the cost advantage held by the aggregations. Their 5% offers are now significantly below the Eversource rate.

According to Applied Economics Clinic, residential customers in the GMA communities at the 5% offering will save an average of 19% compared to Eversource's Basic Service. Small businesses customers will save 18%.[5] Brookline, which leads the way with 25% more renewables, is still two cents below Basic Service. And **customers in those communities who "opt up" to 100% green power will pay roughly the same in their aggregations as they would with Eversource Basic Service**. GMA has brought 100% renewable power to grid parity in these communities.

5 static1.squarespace.com/static/5936d98f6a4963bcd1ed94d3/t/5a1ed4e58165f542d6481501/1511970021847/Updated+CCE+rates_onepager.pdf

Good Energy, the consultant for the communities listed above, attributes this price advantage to the flexibility that aggregations have compared to Eversource and National Grid. The utilities are required by state law to procure power in six month increments. To do that, the utilities have to enter the market during fairly short windows of time. In some cases, they may hit favorable market conditions. In other case, they may be forced to procure at an unfortunate time in the marketplace. By contrast, aggregations are allowed flexibility to time their purchase commitments for when, based upon their expert judgment, market conditions are more favorable for a contract of any length.

The aggregation in Melrose saved its ratepayers approximately $200,000 for the 18 months from January 1, 2016 through June 30, 2017.[6] Unfortunately, circumstances in the electricity market caused Melrose to suspend their aggregation, switching ratepayers back to National Grid's Basic Service. In the summer of 2017, the wholesale electricity market in the Northeast Massachusetts (NEMA) load zone, where Melrose is located, saw a spike in rates due to an increase in the cost of capacity, a significant component of the cost of electricity supply.

The capacity charge, determined in the Forward Capacity Market (FCM) is a reliability charge paid by retail customers to power generators. It is intended to ensure that there will be sufficient generation capacity to meet demand on the hottest and coldest days of the year. The spike in the FCM is expected to last a year or two in the NEMA load zone and will more than double in price, which represents over 30 percent of the overall supply rate. When procuring supply bids to renew the Melrose aggregation program, bidding suppliers offer rates based on the higher cost of capacity costs from across the state, average low cost power for Western and Central Massachusetts (WCMA) and Southeast Massachusetts (SEMA) with higher cost power for NEMA. As a result, until the capacity market settles down, Basic Service is the lower cost option for consumers in Melrose. The City contends, however, that their aggregation has been successful and plans to continue the aggregation program in late 2018 after the current NEMA rate spike ends.[7]

6 **www.mapc.org/our-work-expertise/clean-energy/green-municipal-aggregation**
7 **Melrose.wickedlocal.com/news/20170628/Melrose-community-electricity-aggregation-program-update**

GMA as a Local Climate Mitigation Strategy

Communities committing to climate action must think through strategies for meeting their goals. There is no single measure capable of achieving the deep GHG emission reductions needed between now and 2050, but it is broadly accepted that rapidly transitioning our electricity supply from fossil fuels to renewable energy resources is key. GMA does help achieve desired emission reductions, but there are other factors to consider and benefits to be gained as well.

Community leaders promoting GMA at a hearing in Boston with City Councilors Michelle Wu & Matt O'Malley.

The economics of GMA are sound. It delivers a socially-equitable climate solution. It is scalable. It can be implemented in the near term, but has lasting impacts, too. And, the model is malleable so it can complement and enhance other mitigation measures.

GMA produces significant benefits without subsidy

We acknowledge that there could be occasional six-month periods when Basic Service could be lower than an aggregation's rate. But even if there would be a small premium for GMA above Basic Service, benefits would outweigh the costs over the longer run. Again, reviewing GHG mitigation measures available to communities in the Commonwealth, we see no credible pathway to reducing GHG emissions 40% by 2030 or 80% by 2050 without the purchase and retirement of Class I Renewable Energy Certificates. And GMA represents the most cost-effective way for a community to do so.

And while energy efficiency has the best economics of any GHG reduction method, which should make it a top priority in any energy plan, GMA compares well to efficiency in one respect. Over the last several years, the Mass Save energy efficiency program has produced annual electricity savings between 2.5 and 3 percent of sales for Eversource, National Grid, Unitil, and the Cape Light Compact. **In terms of GHG reduction, savings achievable through GMA (with 5% Class I resources above the RPS) are**

approximately *double* that of historic levels accomplished by Mass Save. Brookline's aggregation is reducing GHG with GMA at a level *ten times* that of the Mass Save program while producing savings for its residents and businesses.

GMA helps deliver a socially equitable climate solution

Our historically dominant energy systems have not been managed with social justice in mind. There have been economic inequities and terrible abuses of disadvantaged communities with respect to the siting of large-scale, polluting energy facilities. As we make the transition from fossil fuels to clean energy, an important question is how to make that happen in ways that reverse the historic pattern so that we have a green economy benefitting all. At Green Energy Consumers we take this question seriously and have been working on it for 35 years. We have many allies in this area, most notably our colleagues within the Green Justice Coalition.

We see the economics of GMA to be very progressive in terms of the allocation of benefits and costs. First, the increased renewable energy content is a public good that accrues to all consumers, regardless of their level of participation (i.e., consumption) in the aggregation. As a point of fact, electricity usage rises significantly with income, meaning that upper income consumers will pay a higher percentage of the costs associated with GMA.

GMA is inclusive, more so than any other clean energy policy except the RPS itself. For example, renters have no barrier to participation, whether their electricity bill is paid by themselves or their landlord. And for the majority of homeowners who cannot install rooftop solar, GMA is a way to receive renewable energy. GMA is inclusive in much the same way as Social Security and public education are, and that creates civic value.

Furthermore, in all the communities we are serving, every consumer has easy opportunity to opt-down to a product that meets the state's RPS but does not have an added cost for Renewable Energy Certificates. On average, this option might save a consumer about $15 per year. It is not a lot, but the consumer has that choice.

Consumers may also opt-out of the aggregation altogether. If they see a better deal from the utility or from a competitive power supplier at any time, they can take it without penalty. Customers who are already served by a competitive electricity supplier are excluded. Residents are informed about the municipal aggregation by mail and other outreach, and given a period of time, usually thirty days, to opt-out preceding its launch. By opting out, a customer would remain on Basic Service or choose their own competitive supplier. Even after program launch, customers are still able to opt-out at no charge whenever they choose. While voluntary, communities forming aggregations with the opt-out approach enjoy a very high participation rate – above 80%.

Although an aggregation does not prevent consumers from choosing a different competitive power supplier, aggregations offer people a safe harbor from a marketplace that too often attracts suppliers with offers that are simply not consumer-friendly. The consumer protection value of aggregation cannot be underestimated.

GMA provides significant, universal benefits essentially without subsidy. Communities have made a purchase decision based upon a rational analysis of the true costs of fossil fuels, including the externalities. GMA is putting green power onto the grid with the support of consumers who have taken a voluntary action without financial support from non-participating ratepayers.

GMA is scalable

GMA is scalable in a few different respects. Without subsidy, GMA has the ability to expand to serve all customers across all rate classes. A given town can start with 80% of its households enrolled and easily expand as others join. New communities can develop plans at their will. And in all cases, the percent of renewable energy in the aggregation's mix is determined by a community's appetite. It can start at one percent in 2018 and increase at any time.

A given community could possibly expand the impact of GMA without causing increased costs to participants by enrolling more customers (those who either initially opted-out or were previously with a competitive supplier). The supplier serving the aggregation would be able to procure the additional green power.

A given community could expand the impact by increasing the percentage of Class I RECs in its mix above the initial value. For example, a community that goes from 5% to 6% above the RPS would be increasing its impact by 20%. A community with an aggregation at zero percent above RPS can make a significant impact by going to one percent. In 2017, that would increase the Class I content from 12% to 13%, which is an effective increase of over 8%.

Most importantly, however, the GMA movement can easily take on more communities. There are enough renewable energy projects existing and on the drawing boards ready to serve New England. When demand appears, suppliers will respond. There may be times when market prices for RECs rise as a result of increased demand, not just from aggregation, but from the RPS itself. But eventually the market will settle out at equilibrium. Supply will meet demand. GMA hastens the process.

GMA can be implemented in the near term

Reducing GHG emissions 80% by 2050 translates to a decline of one percent every six months. Delaying progress to the out-years is irresponsible. There will be technologies and policies that will make more sense ten or twenty years from now, but GMA is a policy that can deliver results almost immediately. Flipping the switch is fairly quick after a community finishes its process of civic engagement and the process of obtaining approval from the Department of Public Utilities. Someone reading this today can imagine their community benefiting from GMA as early as 2019.

GMA enhances other mitigation measures

Because GMA hastens the process of greening the grid, it does more than reduce the GHG emissions from lighting and appliances. It also increases the carbon reduction value of electrifying transportation and home heating. Cars running on Basic Service power have emissions about 75% less than cars running on gasoline, but cars running on the power from GMA have even fewer emissions. Cars charging on Brookline's default product are already close to zero emissions. And consumers who opt-up to 100% are already driving with zero emissions.[8]

8 In general terms, the same can be said for increasing the utilization of high-efficiency cold climate heat pumps.

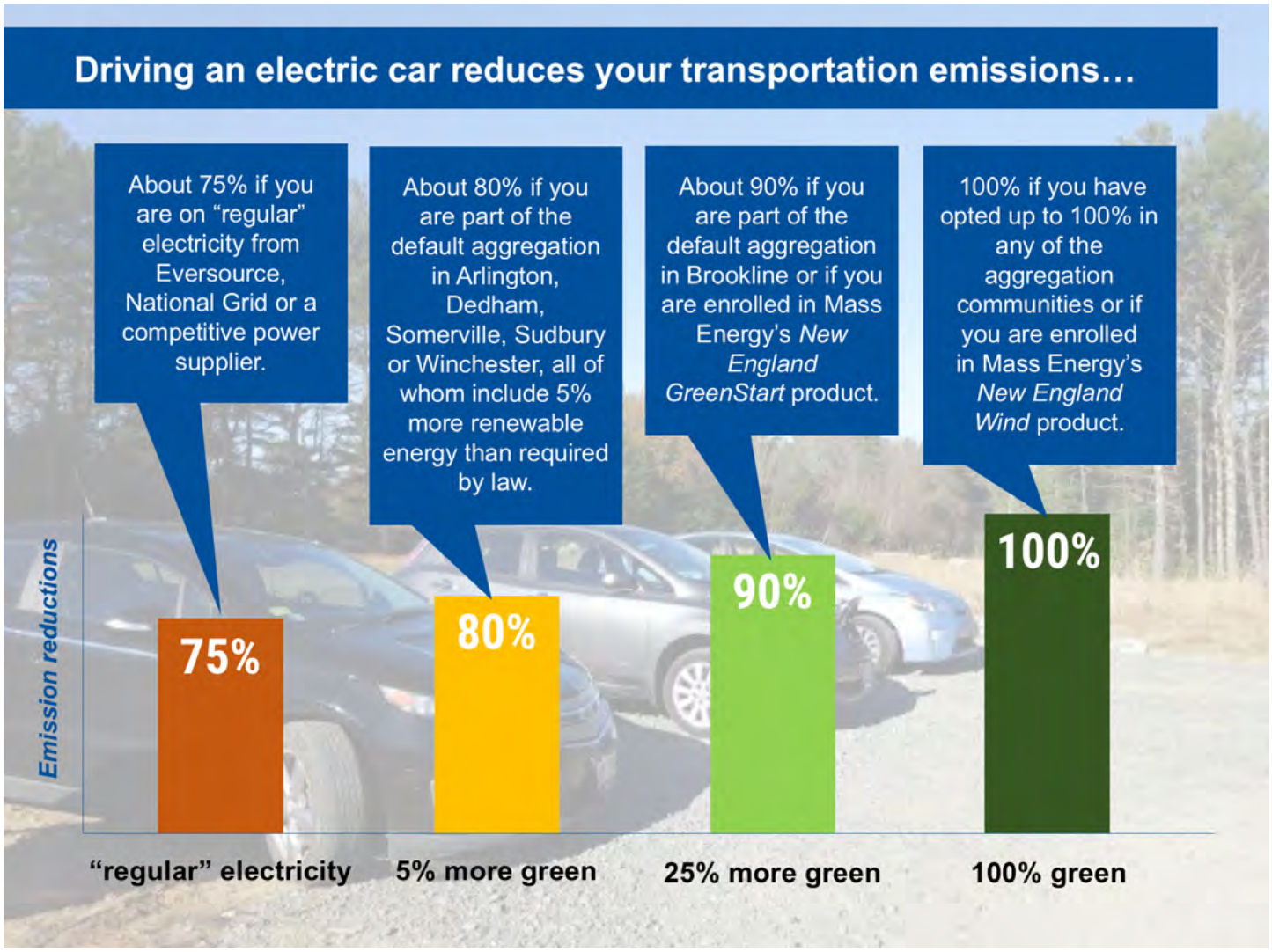


Figure 8

As said above, energy efficiency ought to be at the top of any priority list because it both reduces GHG and has a positive rate of return on investment. But there is absolutely no conflict whatsoever between adding Class I renewables and increasing a community's level of energy savings. Both RECs and energy savings displace fossil fuels and should not be considered antagonistic towards each other. A community's commitment to GMA reinforces the importance of other clean energy measures such as promoting electric vehicles and energy efficiency.

Combining Aggregation With Local Energy Resources

For communities wanting to fight climate change by making the shift from fossil fuels to clean energy, a healthy impulse is to develop solutions right within the city limits. This creates all sorts of opportunities for resilience, job creation, and price stability. Energy self-reliance is a good thing, which is why Green Energy Consumers has promoted distributed energy resources (DERs) since its inception. So how do GMA and the development of local energy resources relate to one another?

Ipswich, MA wind turbine visit

As we discuss further in Appendix 1, Massachusetts is part of the New England Power Pool. A consumer in any one of the six states of New England can be served by a supplier procuring electricity from any power plant serving the region. That can include power plants from Canada and New York that export power into our region. Therefore, utilities offering Basic Service are able to choose power originating from any state capable of supplying our grid and coming from any source. In New England, the "marginal resource", meaning the last one needed to meet additional demand, is natural gas. For this reason, putting more renewable energy onto the grid anywhere in New England displaces fossil fuel generation, consumption, and GHG emissions.

Given all that, Green Energy Consumers strongly prefers wind turbines anywhere in New England, New York, or Canada over methane imported from outside the region and burned in a power plant in New England. We discourage activists from framing a debate as a battle over which is better, out-of-state wind or local solar.

Appendix 5 goes into some detail about how aggregation can be combined with other activities at the local level to develop clean distributed energy resources.

Combining GMA Best Practices

Utilizing municipal aggregation to increase renewable energy content is still a relatively new concept. So far, these are what we have identified as best practices:

1. Communities considering aggregation should form an advisory committee made up of public officials and interested, knowledgeable citizens to study the concept and to take the lead on educating the public and selecting a qualified energy consultant.

2. A consultant should be selected upon their successful experience with aggregation in other jurisdictions and their commitment and demonstrated expertise on additionality. In addition, you may wish you consider whether the consultant is able to integrate other energy services (such as storage) with the supply portion of the aggregation.

3. Once the aggregation has been approved by the Department of Public Utilities and has commenced operation, the previously mentioned advisory committee should continue to meet, perhaps quarterly, to ensure accountability, monitor progress, and learn together about how to optimize the aggregation.

4. If the aggregation is going to offer consumers an opportunity to opt-up to 100% Class I resources, it should have a marketing plan. Some communities have implemented successful campaigns and could be looked to for guidance.

It is our sincerest hope that this paper has shined a useful light on the model of Green Municipal Aggregation, its possibilities, and best practices.

Additional Resources

For further evidence of success, we encourage readers of this white paper to also read "An Analysis of Community Energy Choice for Boston," published in October 2017 by Applied Economics Clinic, which reports on several measures of success – rates, renewable energy content, price stability, administrative costs, and emission reduction. In addition, please see our partner and community websites:

Metropolitan Area Planning Council: www.mapc.org/our-work/expertise/clean-energy/green-municipal-aggregation

Good Energy LLC: www.goodenergy.com/Community-Energy-Aggregation/massachusetts

GMA Community Websites

Arlington: www.arlingtoncca.com

Dedham: www.dedham-ma.gov/departments/community-electricity-aggregation

Brookline: www.brooklinema.gov/1340/Brookline-Green-Electricity

Somerville: www.somervillecce.com

Sudbury: www.sudbury.ma.us/energy/2016/06/08/electric-aggregation-for-sudbury-residents

Winchester: www.winpowerma.com

Original artwork from Massachusetts College of Art and Design student, Christine Rea, created for Green Energy Consumers.

Appendix 1: The New England Electric Grid

New England electricity users are served by a regional power grid. The grid accepts electrons from generators throughout the region – natural gas facilities, hydroelectricity plants, nuclear, and more. Once an electron leaves its source and enters the power grid, it is moved to the nearest transmission station or electricity user at the moment, but one can never know precisely which generator produced an exact electron. However, when renewable electricity is generated, it creates two things: electrons and a REC. The holder of the REC is entitled to claim the environmental and other non-energy attributes of the generation. Once on the grid, there is no way to track specific electrons, but the REC is quantifiable and traceable.

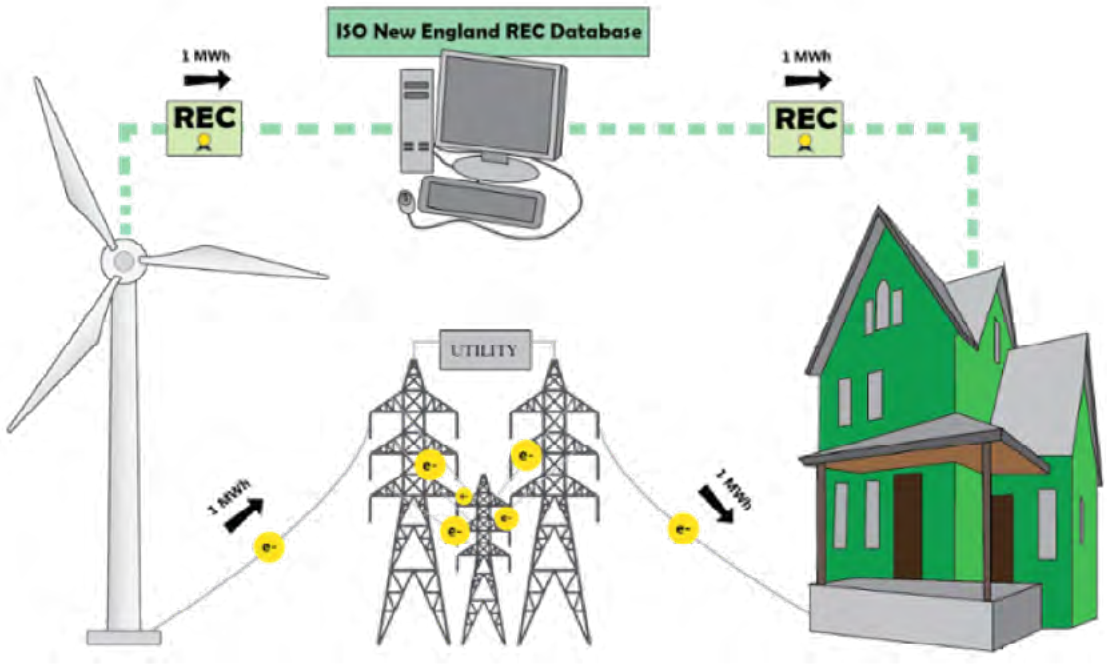


Figure 9

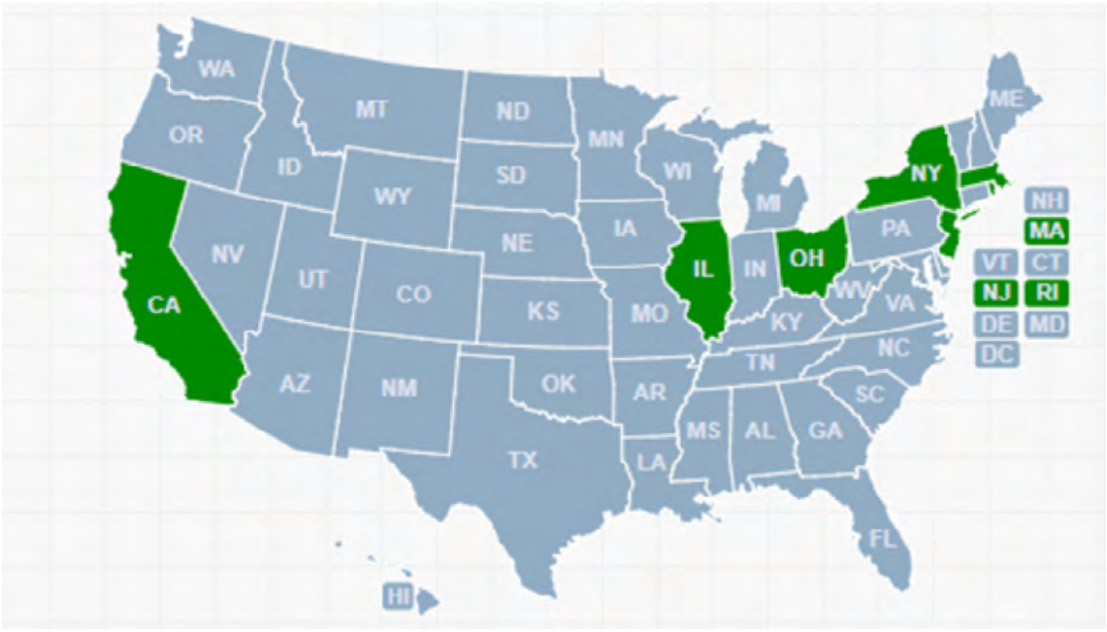
One REC is produced for every megawatt hour (MWh) of electricity generated by a wind turbine, solar panel, or other renewable generator.[9] Once created, an REC is sent to an electronic database administered by **NEPOOL**. This database is known as the "Generation Information System" (GIS) and serves as a tracking mechanism that helps to avoid double counting claims of green power purchases. We know how many MWhs a given resource feeds into the regional electric grid, and thanks to RECs, we know who is claiming to use each and every one. Therefore, if an entity wishes to claim it is consuming renewable energy, it must purchase one REC for every MWh it consumes, and that REC must be retired rather than resold. This process is illustrated in Figure 9.

The GIS was created to facilitate a trading system that would allow renewable energy generators to be paid a production incentive or extra revenue over and above what the electricity market could provide. It is based upon a policy construct that acknowledges the additional value that renewable energy promises in comparison to fossil fuels.

9 One megawatt hour is equal to 1000 kilowatt hours.

Appendix 2: Municipal Aggregation in Other States

Seven states have passed opt-out municipal aggregation laws. In addition to Massachusetts, they are: Rhode Island, Illinois, New York, New Jersey, Ohio, and California.



Rhode Island's old law, the **Utility Restructuring Act of 1996**, allowed residents to choose their own electricity suppliers, but had procedural hurdles that prevented the implementation of aggregation in the state. A new law passed in a special session in September 2017 (House Bill 5536 and Senate Bill 877 Sub A) enables aggregation while maintaining key consumer protections and transparency. We can expect increased municipal interest and activity around aggregation in Rhode Island in 2018 and beyond.

New York houses one municipal aggregation through Westchester Power that services over 100,000 customers across 20 municipalities. In 2016, the New York Public Service Commission published a decision in Case 14-M-0224 to ease the process for communities trying to create municipal aggregations.

New Jersey has had legislation in place for "Government Energy Aggregation (GEA)," as they call it, since 1999 during the electricity deregulation movement. Due to procedural barriers, however, the first aggregation programs did not start until 2012 in townships, such as Plumstead and Toms River. New Jersey's GEA statute requires that aggregation rates be cheaper than the utility's default rate unless the program provides a higher percentage of renewable energy than required by the New Jersey renewable portfolio standard.

Ohio authorized municipal aggregation as part of the Energy Choice Act of 1999. SB 221 helped catalyze aggregation in 2008 by requiring utilities to support large-scale programs. Over 200 communities have adopted aggregation in Ohio, primarily as a tool to reduce costs for their ratepayers. The cities of Cleveland and Cincinnati do offer green power options.

Illinois leads the way in “Municipal Electricity Aggregation,” with over 2 million customers and 700 communities. This trend was enabled by the Electric Service Customer Choice and Rate Relief Law of 1997.

California’s electricity market was only deregulated for a short time due to an electricity crisis in the early 2000s which bankrupted the 3 largest investor-owned utilities (IOUs). Now “Community Choice Aggregation (CCA),” established by AB 117, is the only alternative to buying electricity from IOUs. As in Massachusetts, aggregation is not an option in cities that operate a municipal electric utiltity, such as Los Angeles.

Tour of the wind turbines at Mann Family Cranberry Bog in Plymouth, MA.

Appendix 3: The Importance of Going First Class

There is a lot of renewable energy that would be produced *whether or not someone bought the REC*. The salient question is whether the REC **purchase** is promoting *additionality*, or creating the demand necessary to bring one more renewable MWh onto the grid and verifiably reducing greenhouse gas reductions.

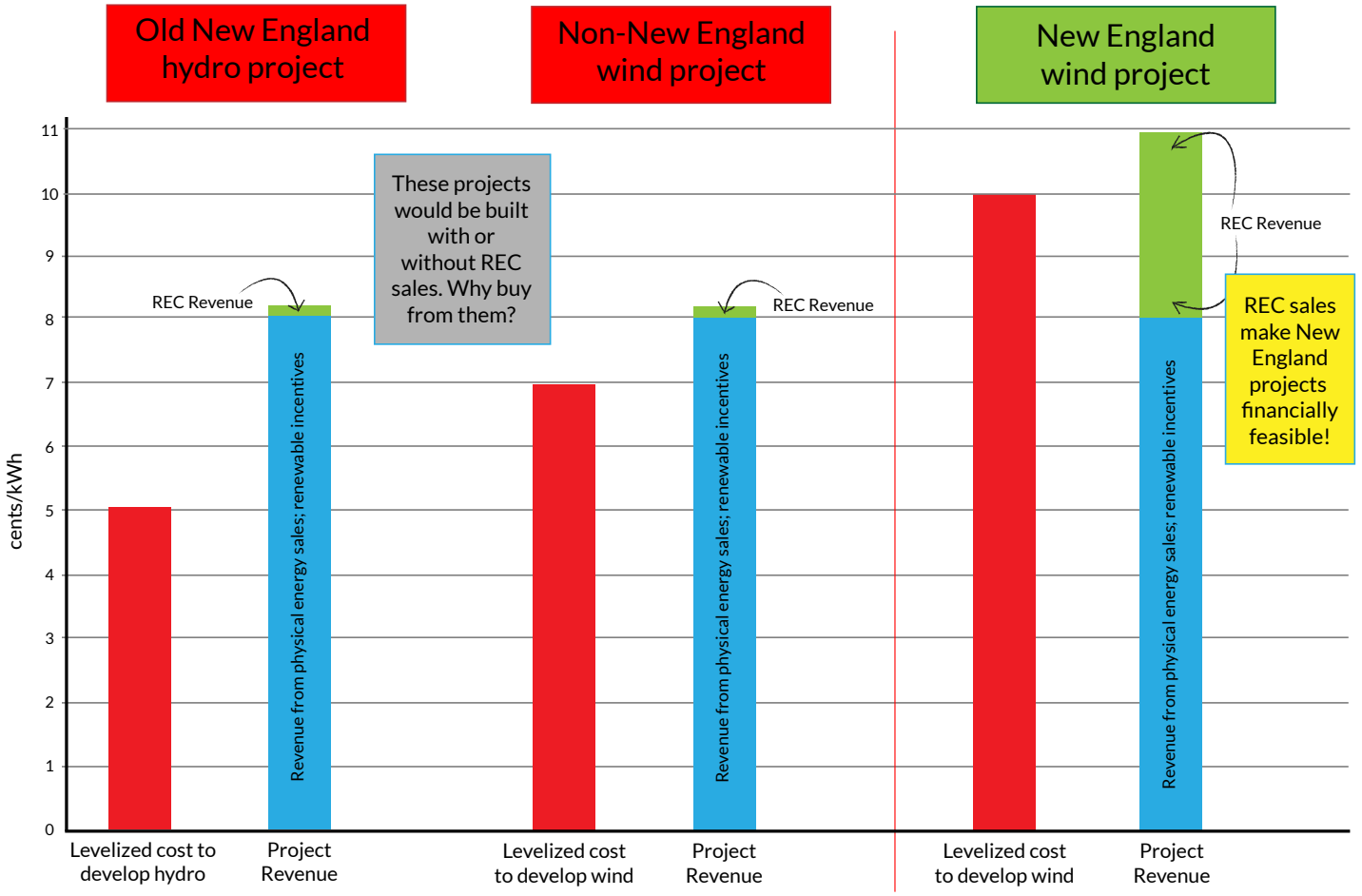
In places like Texas,[10] huge renewable energy projects can be sited and built for less per kWh than it costs to build in New England. Because of the low cost to build the project and other renewable incentives, revenue from RECs is not necessary for project feasibility in these places. Furthermore, these areas tend to have weak RPS mandates because actual supply has surpassed mandated supply, and the law was not revised to keep up. As a result, the voluntary market has been rendered ineffective. Purchasing a REC from Texas certainly has no impact on New England's electric grid. The REC purchase is not even shifting Texas's grid away from fossil fuels; it does absolutely nothing other than enrich a generator who did not require the REC revenue to build and operate.

Purchasing RECs from an old hydropower project located in New England is as ineffectual as buying RECs from a Texas wind project. Some New England hydro facilities have been operating for one hundred years and produce electricity profitably with little or no REC revenue. In fact, large hydropower projects built before 1998 are not eligible for the RPS. Texas wind and old hydro RECs are available on the market for a fraction of a penny per kilowatt hour (kWh). While non Class I RECs are inexpensive, and thus attractive to consumers and commercial or government entities that seek to support the use of renewable energy, the purchase of non Class I RECs do not certifiably result in a displacement of fossil fuels. In reality, selling non Class I RECs is *greenwashing*.

It is not that the those **projects** are unproductive; it is that any **REC sales** from such projects produce surplus profits for developers and are not consequential to the project economics and therefore do not lead to additionality. Dr. Michael Gillenwater is a leading expert on climate change and renewable energy, with a specific focus on greenhouse gas (GHG) measurement, reporting, and verification issues. According to Gillenwater, the **purchase of a REC from such a project** does not impact project development. The price of the REC is simply too small to make a difference in project economics. In other words, if a RECs' value is close to zero, you get what you pay for.

By contrast, Massachusetts Class I REC prices have rarely fetched less than $10 per MWh and have often traded for more than $50 per MWh or 5 cents per kWh. For Massachusetts Class I projects, the REC market is essential. Therefore, buying one Massachusetts Class I REC has a greater impact than buying a thousand RECs that are not Class I.

10 Not just Texas, but Iowa, Pennsylvania, and several other states where wind power supply far exceeds the state's portfolio standard.

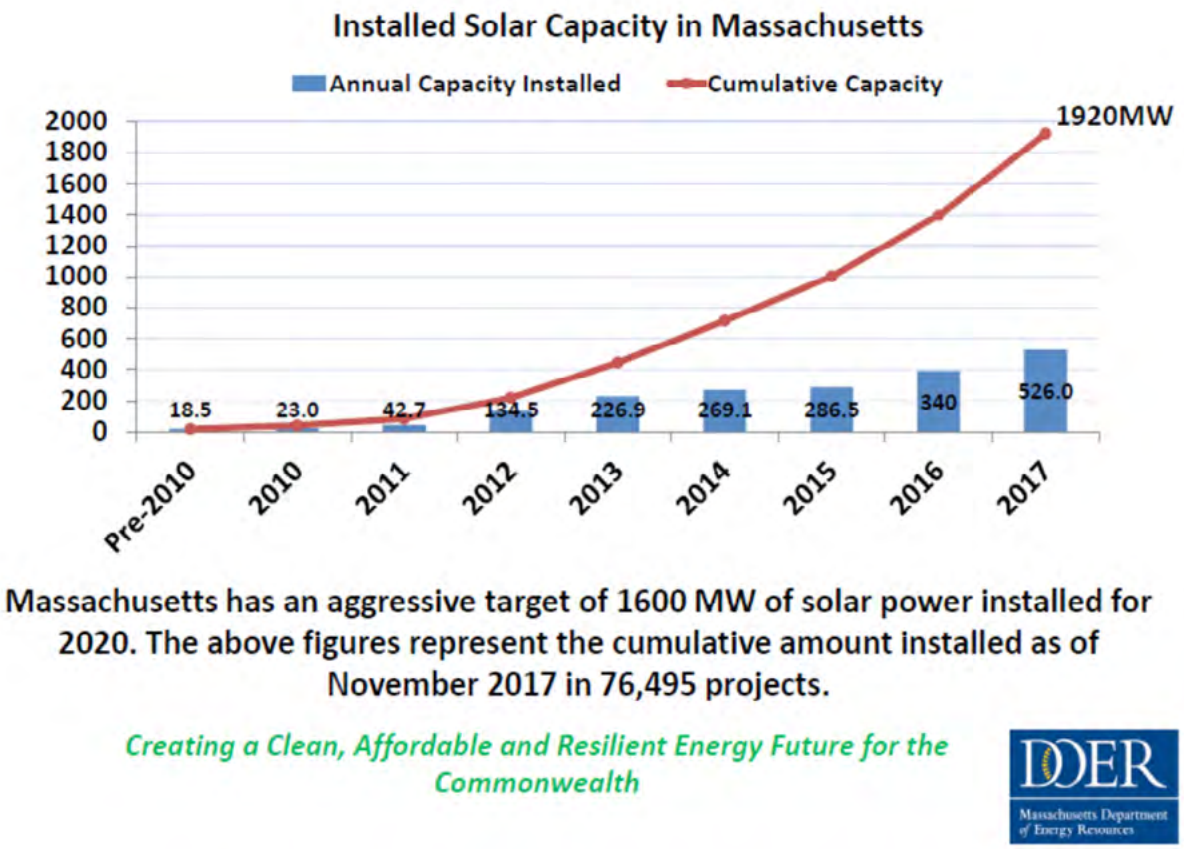


This graphic illustrates that the whole point of the REC purchase is to be the difference maker in a market for renewable energy, to act as a driver for development of *additional* renewable resources above what is currently required by the RPS. Only then does the resource have the ability to displace fossil fuels in New England.

Touring the wind tubine at Mount Saint Mary's Abbey in Wrentham, MA.

Appendix 4: Solar

Before the Green Communities Act was passed in 2008, all resources eligible for the Class I Massachusetts RPS were placed into the same market. Wind, solar, landfill gas, and other eligible projects all competed against one another and all fetched the same value on the REC market. Because solar was and remains more expensive than the other eligible resources, the "old-RPS" was not effective at driving solar development until the Green Communities Act (passed in 2008) changed the RPS beginning in 2010.[11]



Massachusetts has an aggressive target of 1600 MW of solar power installed for 2020. The above figures represent the cumulative amount installed as of November 2017 in 76,495 projects.

Creating a Clean, Affordable and Resilient Energy Future for the Commonwealth

DOER
Massachusetts Department of Energy Resources

To provide a deeper subsidy than other Class I resources, the Green Communities Act created a "Solar Carve-Out" within the RPS. Starting in 2010, solar RECs (SRECs) began earning about ten times what other Class I RECs are earning. And as you can see from the graph above, the Solar Carve-Out has had a dramatic effect. In fact, for 2017, "Solar Power Rocks" ranks Massachusetts as number one in terms of solar friendly policies.[12]

11 *www.mass.gov/service-details/renewable-energy-snapshot*
12 **solarpowerrocks.com/2017-state-solar-power-rankings/**

For 2018, Massachusetts made yet another change to the solar market by launching the Solar Massachusetts Renewable Target (SMART) program, which will reduce the effective REC value of new projects below what SRECs are earning, but keep them significantly higher than Class I RECs.[13] In the SMART program, the energy and RECs from a solar project are bundled together and sold to the distribution company (i.e., Eversource, National Grid, or Unitil) at one compensation rate. Rates differ by size, category and distribution. Block 1 compensation rates are shown below.

	Mass Electric d/b/a National Grid	Nantucket Electric d/b/a National Grid	NSTAR d/b/a Eversource	WMECo d/b/a Eversource	Fitchburg Gas & Electric d/b/a Unitil
Block 1 Compensation Rate ($/kwh)	$0.16	$0.17	$0.17	$0.14	$0.16

We often hear advocates claim solar is not going onto everyone's rooftop and that we need policies to make photovoltaics more broadly accessible so that we can "bring the sun to everyone." There are some excellent models being developed regarding solar on affordable housing and microgrids. But we think it is critical to remember solar is already a part of everyone's mix thanks to the RPS Solar Carve-Out. We are all paying for it in proportion to our consumption, and we are all enjoying its environmental benefits. It is as egalitarian and universal as anything can be. This point is frequently forgotten.

The complexity of the ways in which the federal government and the Commonwealth of Massachusetts incentivize solar complicates the relationship between aggregation and solar.

The 1997 legislation enabling aggregation opens the door to placing an adder on the supply portion of the retail bill in order to assist in the financing of energy projects, including solar installations. But again, it is important to understand how an aggregation might support solar within the context of the state's new Solar Massachusetts Renewable Target (SMART) program. With SMART, the distribution company will place solar RECs into their portfolio for the purpose of meeting their Class I obligation. Should the utility end up having more Class I RECs than they need to comply with the RPS in a given year, they would then sell excess Class I RECs into the market. There does not appear to be a way for a municipal aggregation to plan to buy RECs that originate with the SMART program.

A direct investment in a solar project by an aggregation that involves selling energy and RECs to the local distribution company under the SMART program would have these key attributes and questions:

Mass Audubon
Protecting the Nature of Massachusetts

One of Green Energy Consumers' largest commercial green power customers, Mass Audubon, implements an innovative solution to the question of how to incorporate solar into its GHG reduction plan. The customer has had solar on several of its properties and sells the SRECs into the compliance market. But with proceeds from the SREC sales, it then purchases Class 1 wind RECs to match its electricity consumption. Through this method, Mass Audubon avoids double counting, creates additionality, and appropriately achieves its short-term and long-term goals.

13 On January 11, 2018, Mass. Dept. of Energy Resources announced initial compensation rates for the SMART program, ranging from 15 cents to 40 cents per kWh depending upon the project size and category. These rates include the imputed REC value.

- Presumably there would be a positive rate of return assuming the project's costs were less than the revenue it would earn over time. Additionally, there is a question about whom that rate of return would benefit. Would it be to the site host, whether it is the municipality itself or a private entity?
- If the REC is sold to the distribution company, there would be no additional solar brought to the Commonwealth as a result of this transaction because the SMART program is currently authorized to support a limit of 1600 MW of new solar for the entire state. The transaction could, however, be credited with causing solar to be built within the community. For this reason, folks who are passionate about solar may want to advocate for an expanded SMART program.
- Because the REC is sold to the distribution company so that the utility may comply with the Massachusetts RPS, the aggregation may not claim GHG reduction for the term of the SMART contract, which could be up to twenty years. That would be double counting. It is critical to avoid double counting because it creates an impression to the general public that more progress is being made on clean energy than is actually occurring.

Direct solar investment

Another way to develop solar is **outside** the SMART program. Developing solar projects outside the SMART program would allow a GMA to claim credit for the GHG reduction and add to the amount of solar developed within the Commonwealth.

Participants in Green Energy Consumers' Solar Connect program.

Depending upon the size of the project and how much incentive is paid to the developer, a local solar project would cause a GMA to incur a premium of about five times that of purchasing a Class I REC at today's prices. Solar costs are expected to continue falling over time, so the differential should fall as well. A community may want to occasionally explore its options through Requests for Proposals to determine whether the premium is affordable.

Whether a solar project is developed through SMART or outside SMART and whether the REC would be retained for local GHG credit or not, a key practical consideration is whether an adder placed on the retail supply charge for consumers in a GMA would (a) provide enough capital to develop projects at a meaningful scale, and (b) come at a cost acceptable to the community.

Other Solarize Models: Many communities in Massachusetts have successfully worked with the Massachusetts Clean Energy Center (Mass CEC) on the Solarize Massachusetts model, which seeks to increase the adoption of small-scale solar electricity in participating communities through a competitive solicitation process that aggregates homeowner buying power to lower installation prices for

participants.[14] Green Energy Consumers endorses the Solarize Model and has worked with Mass CEC twice on a similar concept called Solar Connect. In our second **Solar Connect** program, we partnered with **Energy Sage**, an on-line platform for consumers. A sustained effort over many years could develop a substantial amount of local solar and GHG reduction in the out-years.

14 **www.masscec.com/solarize-mass**

Appendix 5: Developing Local Energy Resources

What the statute allows regarding distributed energy resources

The Massachusetts 1997 legislation that enables aggregation allows a community to develop energy programs that go far beyond electricity supply procurement. It states that a community may petition the Department of Public Utilities for control of funds collected for demand-side management. This means the aggregation could potentially administer the Mass Save energy efficiency program rather than the investor-owned distribution company. A community may go further or broader and "group retail electricity customers to solicit bids, broker, and contract for electric power and **energy services** for such customers." It also states the aggregation "is not prohibited from proposing for certification an energy plan which is **more specific, detailed, or comprehensive or which covers additional subject areas** than any such state-wide conservation goals."[15]

This should be interpreted to mean that DPU approval of innovative approaches is possible but not automatic. It would behoove a community to be explicit in its plan about how ratepayer dollars would be spent, not just to garner DPU approval but also to build a strong consensus within the community.

The legislation also allows a municipality to apply to the Massachusetts Clean Energy Center (Mass CEC) for additional funds to be used for clean energy programming. But again, Mass CEC approval is not guaranteed.

Energy efficiency

Amory Lovins, co-founder of the Rocky Mountain Institute and perhaps the most influential person in the field of clean energy, has said that energy efficiency is "the lunch you're paid to eat." This means that money spent on efficiency yields a rate of return. That is why efficiency should be at the top of the priority list at all levels – world, nation, state, community, and personal. It can also play an important role in municipal aggregation.

Many communities looking to aggregate may take notice of the pioneering work of the Cape Light Compact, the state's longest running aggregation, serving 21 towns on Cape Cod and Martha's Vineyard. The Compact focuses just as much effort on efficiency as supply and actually launched its efficiency program in 2001 before its supply program. As an aggregator, the Compact successfully petitioned the DPU for the right to administer revenue (i.e., ratepayer funds earmarked for efficiency, proceeds from Regional Greenhouse Gas Initiative auctions, and Forward Capacity Market payments) to finance its local version of the Mass Save energy efficiency programs.[16] Some communities might be contemplating following the Compact's example. But Green Energy Consumers suggests caution, based

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15 malegislature.gov/Laws/GeneralLaws/PartI/TitleXXII/Chapter164/Section134.

16 We recommend reading the Green Communities Act which governs the energy efficiency program. **www.mass.gov/energy-efficiency-activities-of-utilities**. *Information about "RGGI" may be found at* **www.rggi.org**. *Information about the Forward Capacity Market may be found at* **www.iso-ne.org**.

upon our experience closely monitoring performance statewide of the Mass Save program.[17] There are two fundamental points, somewhat working in opposite directions, worth acknowledging before drawing hard conclusions:

1. Massachusetts has the #1 rated efficiency program seven years in a row. Eversource, the Cape Light Compact, National Grid, Unitil, and the state's gas utilities have been the program administrators all this time. From this perspective, a new municipal aggregation ought to think about its ability to improve upon the performance of the incumbents.

2. Notwithstanding the #1 ranking, the Mass Save program has substantial room for improvement. There are two state laws that should be driving program goals. The Green Communities Act says that we should capture all energy savings that are cost-effective (i.e. costing less than purchasing supply). It is an established fact that the Mass Save program falls far short of that directive. In 2016, the Mass Save electricity program was evaluated to have a Benefit-Cost Ratio (BCR) of 2.66:1 and the gas program was evaluated to have a BCR of 1.95:1. Those ratios indicate that much more energy could be saved before costs exceed benefits.[18] Because we have higher supply costs to avoid here in the Bay State than most other states, we are still not optimizing our investment in efficiency.

So, from the perspective of meeting the needs expressed by the two key statutes, the operative question is whether an aggregation can add value by becoming an efficiency program administrator. At Green Energy Consumers, we come down on these questions by suggesting to municipalities that instead of taking over total administration of the efficiency programs, a community dedicate itself to becoming more deeply engaged in efficiency policy development and implementation in ways that are more likely to add value. There are economies of scale in program administration that a community should acknowledge. The Cape Light Compact has 200,000 customers. Other than Boston, no single community in Massachusetts is at that scale.

We encourage aggregators to participate in the process of developing the Three-Year Plans for Mass Save required under the GCA. Aggregators would also do well by operating strong community-based social marketing campaigns directed at increasing participation in the Mass Save program. Regardless of which category a community finds itself in, the operative question is what an aggregation could do to substantially improve energy savings above the historical record.

Towards that end, the Mass Save program would benefit from more transparency and monitoring by informed citizens across the Commonwealth. Access to program data at the community level has improved recently, but still has a ways to go. We encourage aggregations to demand from their utilities richer and more timely data than is currently available at **www.masssavedata.com** and reports submitted to the Energy Efficiency Advisory Council.

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17 Currently, our Executive Director serves on the Massachusetts Energy Efficiency Council, which oversees the Mass Save program.
18 **ma-eeac.org/results-reporting**

Electrification of transportation and heating

The time has come to shift transportation from oil and diesel to electrification. That means electric passenger cars, buses, and more. As mentioned above, a vehicle running on Basic Service is responsible in 2018 for just 25% of the emissions of an electric vehicle running on gasoline or diesel. The difference will grow over time as the Renewable Portfolio Standard and Clean Energy Standard displace fossil fuels with zero-emission power. But a car powered through GMA would have even lower emissions. Aggregation plans could leverage the low-emission profile of their supply to include components designed to increase EV adoption. Potential ideas:

- Encourage off-peak charging for those charging at home.
- Build out public charging stations.
- Support the purchase and/or charging of electric school buses.

Another form of beneficial electrification is shifting buildings from oil- and gas-fired space heat to high-efficiency, cold climate air source heat pumps. Heat pumps are now supported by both the Mass Save program and the Massachusetts Clean Energy Center. Some communities have already conducted programs for heat pumps patterned after the Solarize model under the **HeatSmart** brand with support from the Clean Energy Center.

Storage is increasingly becoming an energy solution that can be adopted at the local level. Costs are coming down rapidly, business models are developing, and the challenge now is to look for applications that make sense economically given current market rules. Communities may consider developing storage applications combined with electric vehicle charging, local solar installations, demand response programs, and micro-grids for local resilience.

Aggregation plans could also include components involving demand reduction, smart meters, and time of use pricing. All these ideas should be seen as potential supplements or complements to aggregating electricity supply. A key question will always be whether it makes sense to put these ideas into an aggregation plan or if the community should support such activities outside the aggregation.

Ricard Torres-MateLuna and Christine Hatch purchased a heat pump through Green Energy Consumers